IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Yuri Galperin, et al.
Appl. No.	:	09/942,983
PCT Filing Date	:	August 30, 2001
For	:	METHOD AND APPARATUS FOR DETERMINING A PREPAYMENT SCORE FOR AN INDIVIDUAL APPLICANT
Examiner	:	Siegfried E. Chencinski
Group Art Unit	:	3692

PETITION UNDER 37 C.F.R. § 1.183 TO ALLOW CORRECTION OF INVENTORSHIP DESPITE A PREVIOUSLY OMITTED INVENTOR'S REFUSAL TO SIGN A STATEMENT UNDER 37 C.F.R. § 1.48(a)(2) OR THE ASSIGNEE'S INABILITY TO REACH SAID INVENTOR DESPITE DILIGENT EFFORT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Applicants hereby petition the Commissioner under 37 C.F.R. 1.183 to allow correction of inventorship of the above-referenced application despite the failure of a previously omitted inventor, Charles L. Jones III. To sign a statement under 37 C.F.R. § 1.48(a)(2). Charles L. Jones III either refused to sign a statement under 37 C.F.R. § 1.48(a)(2) or could not be reached despite diligent effort. Applicants respectfully submit that justice requires the granting of this petition in order to preserve the right of the owners of the above-referenced patent application in the subject invention. Applicants submit with this Petition the following:

1. Declarations of Inventorship of the above-referenced application signed by Yuri Galperin and Vladimir Fishman. In accordance with *M.P.E.P.* § 409.03(a), the Declaration, signed by all available inventors with the signature blocks of the nonsigning inventors left blank are declarations on behalf of the signing inventors and the nonsigning inventors Charles L. Jones III and William Eginton.

2.   A Declaration of Laura Meltzer, including attached Exbibits A-E, detailing the circumstances of Charles L. Jones III's refusal to sign a statement under 37 C.F.R. § 1.48(a)(2) or the assignee's inability to reach Charles L. Jones III despite diligent effort.

3.   Payment in the amount of $400.00 as required by 37 C.F.R. § 1.17(f) is included as listed on the transmittal letter.

In view of the foregoing submissions and to preserve the right of the owners of the above-referenced patent application in the subject invention, Applicants respectfully request that Applicants' Petition to Correct Inventorship under 37 C.F.R. § 1.48 be granted despite Charles L. Jones III's refusal to sign a statement under 37 C.F.R. § 1.48(a)(2) or the assignee's inability to reach Charles L. Jones III despite diligent effort.

As indicated, payment in the amount of $400.00 as required by 37 C.F.R. § 1.17(f) has been listed in the fees calculated on the transmittal letter. The Assistant Commissioner is authorized to charge any additional fees, including any fees for any required additional extension of time, or credit any overpayment, to Deposit Account No. 11-1410.

Respectfully Submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 9/19/2007   By: _Ted M Cannon_

Ted M. Cannon
Registration No. 55,036
Attorney of Record
2040 Main Street, 14th Floor
Irvine, CA 92614

4287552

-2-

DECLARATION - USA PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, mailing address and citizenship are as stated below next to my name;

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled **METHOD AND APPARATUS FOR DETERMINING A PREPAYMENT SCORE FOR AN INDIVIDUAL APPLICANT**; the specification of which was filed on August 30, 2001 as Application Serial No. 09/942,983.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above;

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56;
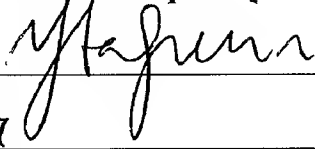
I hereby claim the benefit under Title 35, United States Codes § 119(e) of any United States provisional application(s) listed below.

Application No.: 60/228,954   Filing Date: August 31, 2000

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful, false statements may jeopardize the validity of the application or any patent issued thereon.

_____

Full name of first inventor: **Yuri Galperin**

Inventor's signature _____

Date _8/13/2007_____

Residence: _3100 Franklins Way, Oak_____
_____VA_____

Citizenship: USA

Mailing Address: same as above

Full name of Second inventor: **Vladimir Fishman**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: USA

Mailing Address: same as above

Full name of Third inventor: **William A. Eginton**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: USA

Mailing Address: same as above

Full name of Fourth inventor: **Charles L. Jones III**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: _____

Mailing Address: same as above

Send Correspondence To:
KNOBBE, MARTENS, OLSON & BEAR, LLP
Customer No. 20,995

4093879:kc
080207

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_____

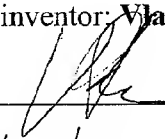Full name of first inventor: **Yuri Galperin**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: USA

Mailing Address: same as above

Full name of Second inventor: **Vladimir Fishman**

Inventor's signature _____

Date _____ 08/13/07 _____

Residence: 339 Main St. Farmington CT 0603

Citizenship: USA

Mailing Address: same as above

Full name of Third inventor: **William A. Eginton**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: USA

Mailing Address: same as above

Full name of Fourth inventor: **Charles L. Jones III**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: _____

Mailing Address: same as above

Send Correspondence To:
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Yuri Galperin *et al.*	) Group Art Unit 3692
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App. No.	:	09/942,983	)
			)
Filed	:	August 30, 2001	)
			)
For	:	METHOD AND APPARATUS FOR	)
		DETERMINING A PREPAYMENT	)
		SCORE FOR AN INDIVIDUAL	)
		APPLICANT	)
			)
Examiner	:	Siegfried E. Chencinski	)
			)

DECLARATION OF LAURA MELTZER

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, Laura Meltzer, declare and state:

1.   I am an executive assistant.

2.   As one of my duties as an executive assistant and as authorized by the assignee of the above-referenced U.S. patent application, I presented or sent the above-referenced patent application to Yuri Galperin, Vladimir Fishman, William Eginton, and Charles L. Jones III, the correct joint and co-inventors in the above-referenced patent application, to obtain each inventor's signature on a declaration of inventorship for the patent application and to obtain Charles L. Jones III's signature on a statement that he believes he should be named as an inventor in the above-referenced application and that he was omitted as an inventor without deceptive intent on his part.

3.   Yuri Galperin and Vladimir Fishman have signed and returned the declaration of inventorship. True and correct copies of the declaration of inventorship signed by Yuri Galperin and Vladimir Fishman are attached hereto as Exhibits A and B.

4. William Eginton and Charles L. Jones III have not signed and returned the declaration of inventorship.

5. On August 8, 2007, I sent, via electronic mail, a copy of the above-referenced patent application and a declaration of inventorship to William Eginton at his last known e-mail address of drew@eginton.net.

6. On August 14, 2007, I again sent, via electronic mail, a copy of the above-referenced patent application and a declaration of inventorship to William Eginton at his last known e-mail address of drew@eginton.net. True and correct copies of the e-mail message and the attached documents that I sent to William Eginton on August 14, 2007 are attached hereto as Exhibit C. The attachments of Exhibit C are true and correct copies of documents attached to the August 8, 2007 e-mail message to William Eginton.

7. On September 6, 2007 I again sent, via electronic mail, a copy of the above-referenced patent application and a declaration of inventorship to William Eginton at his last known e-mail address of drew@eginton.net. True and correct copies of the e-mail message and the attached documents that I sent to William Eginton on September 6, 2007 are attached hereto as Exhibit D.

8. On September 6, 2007, I received an e-mail delivery verification message indicating that the September 6, 2007 e-mail message of Exhibit D had been relayed to William Eginton at his last known e-mail address. A true and correct copy of the e-mail delivery verification message is attached hereto as Exhibit E.

9. William Eginton is commonly known by the nickname "Drew." The e-mail messages attached hereto in Exhibits C and D thus refer to William Eginton as "Drew."

10. Besides the last-known e-mail address of drew@eginton.net, I do not know other contact information for William Eginton. I am informed and believe that nobody at the assignee of the above-referenced application knows other contact information for William Eginton.

11. I have not received from William Eginton any response to my e-mail messages and have not returned a signed declaration of inventorship from William Eginton.

12. I called Charles L. Jones III's last-known mobile telephone number of (617) 478-5862 on August 8, 2007. As Charles L. Jones III did not answer the phone, I left a voicemail message for him, informing him that he was being added as an inventor in the above-referenced application and that I had documents that I needed to send him for his signature.

13.   As I did not receive a return telephone call from Charles L. Jones III, I again called his last-known mobile telephone number of (617) 478-5862 on August 14, 2007, August 17, 2007, August 27, 2007, August 30, 2007, and September 6, 2007.   On each of these occasions, the line did not ring, but went dead.

14.   I have not received any return telephone call or any other response from Charles L. Jones III in response to my August 8, 2007 voicemail message.

15.   Besides the last-known mobile telephone number of (617) 478-5862, I do not know other contact information for Charles L. Jones III.   I am informed and believe that nobody at the assignee of the above-referenced application knows other contact information for Charles L. Jones III.

16.   I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further declare that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Dated: ___/4 September 2007___   By: _____
                                             Laura Meltzer

4262970

-3-

EXHIBIT A

DECLARATION - USA PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, mailing address and citizenship are as stated below next to my name;

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled **METHOD AND APPARATUS FOR DETERMINING A PREPAYMENT SCORE FOR AN INDIVIDUAL APPLICANT**; the specification of which was filed on August 30, 2001 as Application Serial No. 09/942,983.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above;

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I hereby claim the benefit under Title 35, United States Codes § 119(e) of any United States provisional application(s) listed below.

Application No.: 60/228,954   Filing Date: August 31, 2000

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Full name of first inventor: **Yuri Galperin**

Inventor's signature _____

Date ___8/13/2007___

Residence: ___3100 Franklins Way, Oak___
___VA___

Citizenship: USA

Mailing Address: same as above

Full name of Second inventor: **Vladimir Fishman**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: USA

Mailing Address: same as above

Full name of Third inventor: **William A. Eginton**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: USA

Mailing Address: same as above

Full name of Fourth inventor: **Charles L. Jones III**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: _____

Mailing Address: same as above

Send Correspondence To:
KNOBBE, MARTENS, OLSON & BEAR, LLP
Customer No. 20,995

4093879:kc
080207

EXHIBIT B

DECLARATION - USA PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, mailing address and citizenship are as stated below next to my name;

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled **METHOD AND APPARATUS FOR DETERMINING A PREPAYMENT SCORE FOR AN INDIVIDUAL APPLICANT**; the specification of which was filed on August 30, 2001 as Application Serial No. 09/942,983.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above;

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56;

I hereby claim the benefit under Title 35, United States Codes § 119(e) of any United States provisional application(s) listed below.

Application No.: 60/228,954   Filing Date: August 31, 2000

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful, false statements may jeopardize the validity of the application or any patent issued thereon.

- -

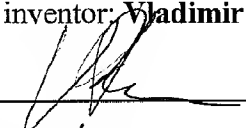Full name of first inventor: **Yuri Galperin**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: USA

Mailing Address: same as above

Full name of Second inventor: **Vladimir Fishman**

Inventor's signature _____

Date _____ 08/13/07 _____

Residence: 339 Main St. Farmington CT 0603

Citizenship: USA

Mailing Address: same as above

Full name of Third inventor: **William A. Eginton**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: USA

Mailing Address: same as above

Full name of Fourth inventor: **Charles L. Jones III**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: _____

Mailing Address: same as above

Send Correspondence To:
KNOBBE, MARTENS, OLSON & BEAR, LLP
Customer No. 20,995

4093879:kc
080207

EXHIBIT C

Ted.Cannon

From:	Meltzer, Laura [Laura.Meltzer@experian.com]
Sent:	Tuesday, August 14, 2007 11:19 AM
To:	drew@eginton.net
Subject:	Consent of Assignee to Correct Inventorship Documents
Attachments:	2007-08-02 Declaration-w_4inventors EXP.046A.DOC; Consent of Assignee To Correct Inventorship.DOC; EXP.046A Application as filed.pdf

Hi, Drew.

I didn't hear back from you, but now have more information regarding what the attorney wants you to sign:

Marketswitch filed patent applications in 1998 and 2001 for a prepayment score model that you co-invented. We have become aware that the 2001 application incorrectly does not list Charles Jones as an inventor. We want to correct this so that Charles will correctly be listed as an inventor. To make this correction, we need each inventor to sign a declaration to acknowledge that each of the four inventors, including Charles, contributed to the invention.

The documents to be signed are attached. Your name appears on page 2 of the Declaration. And you would sign the Consent of Assignee as an officer of Marketswitch. If you want to FedEx the signed docs back to me, you can use account number 2165 1769 5, and Experian will pay.

Thanks,

Laura Meltzer
Executive Assistant

Experian Decision Analytics—Americas

2350 Corporate Park Drive
Suite 400
Herndon, Virginia

Tel: 571/434.4232
Fax: 703/444.6812

SPECIFICATION

TITLE: METHOD AND APPARATUS FOR DETERMINING A
PREPAYMENT SCORE FOR AN INDIVIDUAL APPLICANT

RELATED APPLICATIONS

[01]   This application claims the benefit of Provisional Application Serial No.

60/228,954, filed August 31, 2000, which is incorporated herein in its entirety.

FIELD OF THE INVENTION

[02]   This invention relates generally to receiving applications for and processing of

lending transactions. More specifically this invention provides a method and

apparatus to assess the prepayment propensity of a borrower in the form of a

prepayment "score" to enable assessment of (i) the value of mortgages, second

mortgages, home equity loans or other debt instruments for investors, (ii) the value

of credit card accounts and balance transfers, (iii) the value of term loans and leases,

(iv) the behavior of brokers with respect to churning, (v) the valuation of existing

portfolios, (vi) the risk management of institutions that hold debt instruments, and

(vii) the pricing of mortgage portfolio servicing contracts.

BACKGROUND OF THE INVENTION

[03]   By way of an introductory example, consider the most common of debt

instruments, the consumer mortgage. The value of a mortgage depends, in large part,

on the duration of the mortgage. At the inception of the mortgage there are broker

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fees and various other settlement costs that are charged to the lender. When a

mortgage extends for the term of many years, there is an opportunity for the lender to

recoup costs of putting a mortgage in place for a given consumer and to make profit

on that mortgage. This is particularly important for all business organizations that

lend money, but it is particularly important for those mortgage financing

organizations which have stockholders and other investors.

[04]   When a mortgage loan is paid off early due to refinancing, depending upon how

early in the term, the mortgage loan is paid off, there is the possibility that the

lending institution can actually take a loss on the particular mortgage. The rate of

prepayment depends on a number of objective factors. For example, during times of

decreasing mortgage rates, on average, more consumers refinance their home loans

than would otherwise occur, in order to obtain a lower monthly payment. However,

for a given macroeconomic environment and other measurable, objective factors,

each consumer evidences an individual propensity to prepay a loan. This

prepayment propensity reflects the consumer's demographic and other objective

attributes. A system that can assess such individual prepayment behavior by a

consumer in advance of the loan will lead to more profitable loans being made, and

hence the enhanced availability of funds for loans to more consumer-borrowers. The

present invention therefore may be applied, without limitation, to a) the pricing of

mortgages and other debt instruments, b) the valuation of existing portfolios of debt

instruments, and c) the risk management of institutions that hold debt instruments.

[05]   Additionally, the present invention is not limited to the type of debt instrument or

lending transaction to which the prepayment score is useful. The invention includes,

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but is not limited to, mortgages (consumer and commercial), second mortgages, refinanced mortgages, consumer loans, commercial loans, asset-backed loans, consumer leases, commercial leases, credit card accounts, credit card balance transfers, debt consolidation loans (term notes, etc.), mortgage-backed securities (i.e., mortgage pass through, CMO's, mortgage-backed bonds, principal-only, interest-only, etc.), and any servicing contract for these lending transactions that performs financially based on the quality (i.e., duration) of the cash flow.

[06]   A further element of the present invention is the monitoring and scoring of brokers for these lending transactions. Mortgage brokers deal with both consumer-borrowers and lenders-clients. In order to generate brokerage fees, it is possible for a broker to encourage its consumer-borrowers to refinance their mortgages frequently and prematurely. When this occurs, the mortgage broker generates a fee for the broker, however, early prepayment of the prior mortgage instrument can result in a loss for the lender. Thus the present invention also has the capability to score mortgage broker prepayment behavior.

[07]   The behavior of a broker is sometimes not all heinous. Sometimes a consumer, who is particularly attuned to the rise and fall of interest rates, will simply be the one who changes mortgage instruments more frequently than the average consumer. The broker who is scored based upon the prepayment behavior of the consumers that the broker brings to lenders, would like to know the pre-payment propensity for the given consumer. This would be useful so that the mortgage broker can optimize the broker's relationship with its lender-clients by only bringing consumer-borrowers who have a low prepayment propensity.

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[08]   Therefore, lenders and brokers badly need the ability to better measure

prepayment behavior in advance of incurring marketing or underwriting charges;

these expenses are too great to absorb blindly on behalf of consumers with poor

prepayment propensities. Indeed, a beneficial use of the invention would be in

managing the initial marketing effort itself. For example, only those customers who

can be shown to score favorably for prepayment behavior might receive a solicitation

for a mortgage product A. Consumers who are revealed to represent a substantial

prepayment risk may be offered a more suitable mortgage product B, reflecting the

increased risk. In this way, enhanced customers segmentation and product design

initiatives converge to benefit consumers and their sources of debt financing, to the

benefit of each.

[09]   To understand the potential impact of national prepayment scoring standard, as

manifested in the present invention, one need look no farther than the existing

default risk scoring standard, owned and distributed by Fair, Isaac and Company,

Inc. (Fair Isaac) for over 30 years. By establishing a standard methodology for

scoring borrower default risk, and broadly disseminating it, Fair Isaac dramatically

enhanced mortgage lender insight into expected loan dynamics. In finance,

enhanced insight is synonymous with enhanced information. Enhanced information

implies reduced risk for the lender. Finally, reduced lender risk profiles produce

lower costs of capital. In other words, because Fair Isaac standardized successfully a

fungible measurement of default risk, more money is available for consumers to

borrow, at better and cheaper interest rates. The market is more efficient than before

and everyone benefits.

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[10]   To further qualifying the timeliness of the invention, please refer to exhibit 1,

"Green Tree chief returns $23 million..." The Wall Street Journal, March, 1998. This

story highlights the industry wide uncertainty surrounding prepayment speeds in

consumer debt portfolios. One industry leading company, Green Tree Financial, "has

been hit hard the past year by escalating loan losses in the painful recognition that its

accounting has been too aggressive. Also, an unexpected wave of loan prepayments

hit the industry, as borrowers sought lower interest rates, indicating working-class

consumers were not as unsophisticated as lenders had believed." Stated plainly,

Green Tree overstated prior year earnings significantly, exercising its option under

GAAP accounting to roll forward and capture in advance projected lending profits,

even though those very profits were merely estimated based in part on arbitrary

prepayment assumptions. In large measure because Green Tree badly miscalculated

these prepayments speed assumptions, in 1997 the company was forced to charge off

$390 million of 1996 reported profit. In 1998 the company was sold off to Conseco.

[11]   Earlier disclosures in the area of prepayment scoring in a lending context are

limited or nonexistent. United States Patent No. 5,696,907, entitled "System and

Method for Performing Risk and Credit Analysis of Financial Service Applications,"

issued to Tom. The Tom patent discloses using a neural network to mimic a loan

officer's underwriting decision making. The method of the Tom patent is based on a

non-iterative regression process that produces an approval criterion that is useful in

preparing new or modified underwriting guidelines to increase profitability and

minimize losses for a future portfolio of loans. A prepayment observation is used in

the neural net as a negative flag, but no prepayment scoring system is utilized in the

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Tom patent.

[12]   In view of the prior art, there is a clear need for measuring and predicting a

consumer's prepayment propensity, as well as a clear and strong need for a method

and apparatus to produce such a measuring and predictive parameter.

BRIEF SUMMARY OF THE INVENTION

[13]   The system and method of the present invention generally works in the following

manner: the service bureau or broker will electronically capture individual loan

applications from consumers. Those loan applications will be sent to lenders for

evaluation. The lender, using the present invention submits the loan application for

review and analysis. The loan application will be reviewed by the present invention

according to a sophisticated economic and customer behavior model, which will

score the prepayment behavior of candidate borrowers. The score for these

borrowers, which is an index of their prepayment propensity, will be electronically

returned to the lender. The lender will in turn use the prepayment score and calibrate

an appropriate mortgage price including the setting of interest rates, fees, broker

commissions, and potentially consumer rewards. Using this consumer scoring

technique, a lending institution can seek to contact or contract with those consumers

who display a low propensity to prepay.

[14]   The advanced scoring of customer prepayment propensities materially improves

the lender's to risk profile as regards new lending customers. This novel insight adds

value to the marketing, underwriting, lending, administrative process for first and

second mortgages, credit card balance transfers, and asset-backed term loans such as

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automobile loans. By assisting lenders in their efforts to segment customers according to this crucial behavior metric, waste and excess costs are driven from the lending economy. More money is thus available, more cheaply, for more people.

[15]   To the borrower, this system offers several advantages. First, more favorable loan terms can be made to those consumers who exhibit a beneficial borrowing behavior, i.e., borrowers who are not likely to prepay their loans but instead maintain their loans for a profitable duration. Further, dealing with a stable borrower market results in a more favorable financial environment on for all lenders thereby mitigating the risk of loss and, in the normal course of all efficient markets, passing that financial advantage onto borrowers generally.

[16]   Once again, the irrefutable economic relationship between financial risk-taking and expected financial reward informs the environment addressed by the present invention. If lenders reduce their risks-and by extension their costs-through enhanced prepayment scoring, ultimate borrowing costs paid by consumers will decline.

[17]   For the loan originator, the system offers several advantages. The loan originator can more efficiently price the particular loan. Further the loan originator can more efficiently select brokers and intermediaries who will select the best borrowers. Further, the system and method of the present invention will lead to more efficient direct and indirect marketing investments by identifying individual consumers and groups of consumers who exhibit the most beneficial borrowing behavior, i.e., a propensity not to prepay financial obligations.

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[18]   Given that direct marketing costs are exploding as the conventional direct

channels (e.g. mail and outbound telemarketing) become saturated, any available

efficiency in the direct marketing process is highly desirable. For example, in the

marketing of home equity lines of credit (i.e. second mortgages), direct-mail

response rates are now, on average, running below 0.3% (i.e. below 3/10ths of one

percent). Obviously, some fraction of even this small respondent sample will prove

ill-suited, as regards prepayment behavior, for the debt product being marketed.

Therefore, the tailoring of specific debt products to consumers of specific

prepayment behavior characteristics is essential to the efficient pricing of debt

instruments. Lead generation, third-party data acquisition, underwriting, yield

spread calculations all directly inform debt instrument profitability, and are all

beneficially affected by the present invention.

[19]   Finally, in the context of sophisticated asset liability management (ALM), subtle

prepayment behavior analysis provides significant benefits to its practitioners.

Because ALM, as a primary objective, seeks to minimize destructive asymmetries in

asset and liability cash flows, intelligent risk managers will utilize debt contracts of

varying expected durations to strengthen their balance sheet. For example, a lender's

risk manager may seek multiple classes of debt instrument, reflecting multiple

prepayment profiles, in order to assure himself of adequate incoming cash flow to

sustain his expected liability cash outflows. In the matching, therefore, of expected

cash in- and out-flows, the prudent risk manager utilizes a carefully segmented

portfolio of debt instruments scored by prepayment propensities (and other meaures)

and priced accordingly, to avert liquidity crises.

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[20]   An additional, equally valuable use of the present invention is in the valuation of

existing mortgage or debt instrument blocks of business. This valuation may be

required by lender risk managers, auditors, regulators, or investors; it may reflect

stakeholder interest in actively managing asset-liability risk, or it may be performed

as part of the merger and acquisition appraisal. In all instances, the prepayment

scoring system quantifies from a granular perspective upward to a pool, or block

perspective, the prepayment speed characteristics of the debt instruments. As we

have seen in the Green Tree case, failing to adequately price prepayment risk has

enormous balance sheet implications, and typically leads one to grossly over value a

portfolio or the enterprise itself.

[21]   For auditors, the system of the present invention offers a quantitative measure of

prepayment risk thus reducing auditor exposure to "claw-back" write-downs. This

situation occurs in the case of issuers that secure these mortgages and, under the

generally applied accounting procedures (GAAP) accelerate and capture earnings

based on certain prepayment assumptions. If those prepayment assumptions are

incorrect, prior year financial statements are incorrect and massive charges are

required to reflect lower portfolio earnings.

[22]   For banking regulators, the system of the present invention offers the ability to

quantify balance sheet risk resulting from expected consumer prepayment behavior.

This will allow regulators to more precisely measure and assign minimum bank

capital levels.

[23]   For credit rating agencies, the ability to score according to an objective, standard

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methodology prepayment risk provides enormous assistance in rating a lender's creditworthiness. Rating agencies function, effectively, as credit market bellweathers. Lending institutions are dependent on favorable credit ratings in order to float their institutional debt at advantageous rates; rating agencies, as in the case of regulators, evaluate carefully lenders' claims of capital adequacy; the capital (cash reserves) retained by lenders is directly and immediately affected by debt instrument prepayment speeds. This is because, under GAAP accounting rules, lenders are allowed to capture a substantial percentage of the future expected profits for a given contracted debt instrument, and those profits are themselves substantially dependent on the assumed life of the instrument. (In the case of subprime mortgages, for example, profits may double if the mortgage is maintained in force for four years instead of three). If those profits are overstated, they must be reversed, with resultant charges reducing lender capital (capital: paid-in cash investments plus retained profits). Therefore, rating agencies must scrutinize lender portfolio prepayment speed assumptions, because if those assumptions prove false, then the lender will suffer a reduction in capital. Any significant impairment of lender capital necessarily suggests a reduction in its credit rating. Credit rating agencies will be major beneficiaries and users of the present invention.

[24]   For investment bankers, the system of present invention establishes a standardized prepayment methodology that allows merger and acquisition advisers to be able to quantitatively measure the balance sheet risk in a target banking or mortgage company. In addition, investment bank usage of the present invention will include its application to debt instrument securitization. Securitization describes the process

by which pools of mortgage or other debt instruments are purchased by investment banks-in their capacity as underwriters-and re-sold to institutional and public investors as reconstituted securities. Typically, these securitizations benefit originators of debt, because they realize significant acceleration in realized profits; they also significantly diversify their risks by selling significant aspects of the debt instrument to asset underwriters and others. However, the typical debt instrument securitization proceeds with the originating lender retaining significant prepayment risk; if prepayment speeds accelerate beyond levels assumed in the securitization pricing process, the originating lender is held responsible. Hence the invention, by measuring the expected prepayment behavior and scoring in according to an accepted, industry standard method, will improve the securitization process and render it more efficient. Once again, this will reduce costs for all participants and free up more capital for lower-cost consumer borrowing.

[25]   For investors, the method of the present invention provides a way to make investment decisions based upon quantified debt instrument prepayment behavior risk for lending institutions in which investors might want to invest, or to evaluate the relative stability of mortgage securities that are backed by individual debt instruments.

[26]   These and other advantages of the present invention are described in reference to the specification that follows.

BRIEF DESCRIPTION OF THE DRAWINGS

[27]   **Figure 1** is an overview of the process of the present invention.

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[28]   Figure 2 is a block diagram of the present invention.

[29]   Figure 3 is a block diagram showing the user interface module connections.

[30]   Figure 4 is block diagram showing the interactions with the prepayment historical

data.

[31]   Figure 5 is a block diagram showing the interactions with the econometric model.

[32]   Figure 6 is a block diagram showing the factors that are used by the user interface

module.

DETAILED DESCRIPTION OF THE INVENTION

[33]   Referring to **Figure 1**, an overview of the process of the present invention is

shown. The mortgage broker or lending institution first obtains a loan application

from a borrower **10**. That information is electronically transmitted to the present

invention, which parses the information **12** of the loan application into various

categories that are relevant to the scoring of the potential loan. The loan application

contents are parsed based upon the information needs of a sophisticated,

mathematical model resident in the present invention. A prepayment score is then

derived **14** for the particular consumer as a function of the particular loan type being

requested, and in further view of the interest rate environment in which the loan is

being processed (i.e. rising or falling interest rates). As previously noted this score is

an indication of the prepayment propensity of a particular consumer. The

prepayment score is then returned to the lender **16**. Thereafter the lender can create a

customized loan product that rewards favorable prepayment behavior of the

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consumer **18**.

[34]   Referring to **Figure 2**, an overview of the system of the present invention is

shown. A loan originator **20** receives the application from a potential consumer.

That application is then input to the loan originator's data delivery channels **22**. Such

data delivery channels **22** are (without limitation) e-mail, fax, Internet, and generally

other electronic means. Other loan originators **34** also send their respective

consumer applications over their own data delivery channels **36**.

[35]   The present invention anticipates delivery of loan applications **24** over the

Internet **28** or other digital electronic means such as wireless communications

methods as well. Electronic loan applications **40** enter the system of the present

invention through a communication server **42**. The loan information concerning a

given consumer is then submitted to an application parser **52**. Application parser **52**

divides the information into loan information **58** and applicant information **56**. Loan

information **58** is information that relates to the amount, the term, down payment,

loan type, and other information important and relating to the amount of money to be

loaned. Applicant information **56** is information such as name, address, Social

Security number, and other demographic information concerning the applicant.

[36]   Loan information **56** is fed into a prepayment model library database **66**. The

prepayment model library database **66** comprises information concerning

prepayment historical data **62**. The results are fed into model training server **64**

which processes prepayment historical data **62** of both an individual and

demographic groups which in turn provides updates to the model library database **66**.

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Once loan information **58** is processed by the prepayment model library database **66** an analytical prepayment model **60,** which is based upon the loan information **58 is** provided to the prepayment calculation server **46.** Prepayment calculation server **46** receives additional information from econometric model **48** which establishes the relationship among the wide variety of variables. Econometric model **48** generates interest rate, mortgage rate and other economic parameters that, arrayed in time series, comprise scenarios utilized by the prepayment calculations server. These scenarios are generated from the Low Discrepancy Sequence (LDS) logic, rather than using random number generation. The LDS logic affords significantly higher model accuracy with the same number of scenarios.

[37]   Once a prepayment score **44** is derived by prepayment calculation server **46,** prepayment score **44** is sent to the communication server **42** and is transmitted over the Internet (or other electronic channels) **28** through the data delivery channels **22** or **36** back to loan originators **20** or **34** who can then either approve, disapprove, or create customized loan product for the consumer.

[38]   Prepayment score **38** is calculated based upon the following model. The specific prepayment analysis of the present invention is conceptually shown below.

[39]   The following variables:

[40] $A = (a_1, a_2, \ldots, a_n)$

[41] $L = (l_1, l_2, \ldots, l_m)$

[42]   are vectors of the applicant's data and loan parameters.

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[43] $E_s(t) = (e_{1s}(t), e_{2s}(t), ... e_{ks}(t));$ $s = 1, ..., S$

[44]   denotes a set of Low Discrepancy Sequence (LDS)-based scenarios of the econometric parameters, which have been generated by the RTH Linked Index Econometric Model. Thus the model is a set of stochastic differential equations that describe the dynamics and interaction of major macroeconomic indicators, each relevant to the prepayment propensity calculation.

[45]   Analytical Prepayment Model $\Re$, which varies with the types of loan applied for, is trained to calculate prepayment value p_s in a given scenario based on the applicant's data (A), loan parameters (L), and econometric parameters (E):

$$p_s(t) = \Re(A, L, E_s(t))$$

[46]   Total prepayment, accumulated by the time T in scenario s, can be calculated as:

$$P_s(T) = \prod_i p_s(t_i)$$

[47]   Then, total prepayment at time T is given by:

$$P(T) = (1/S) \sum_{s=1}^{s} P_s(T)$$

[48]   Finally, the prepayment score is:

$$Score = \sum_T TP(T)$$

[49]   The analytical model that produces the prepayment score may be further informed

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by additional external behavioral or econometric factors, based on subsequent research, as well as the aforementioned behavioral scoring of mortgage broker behavior.

[50]   The present invention may also be represented in an alternative embodiment in the form of the credit engineering workstation (CEW). This CEW (more fully described below) comprises a user interface which allows a loan originator to conduct all of the prepayment calculations, model analysis, and pricing of the present invention using the prepayment model first noted above.

[51]   The CEW operates in either a Unix or Windows NT environment using Oracle, SQL server, Sybase, DB2, or Informix database support. The CEW also uses CORBA or, structured object models together with a JAVA/HTML browser based graphical user interface.

[52]   The subroutines of the CEW all contribute to the end goal of determining the prepayment propensity of a consumer. For example, subroutines of the present invention deal supports the generation of various interest rate scenarios, and subsequent economic scenarios model fitting processes that fit the modeled interest rates scenarios to historical and current interest rate yield curve performance as well as to other macro economic indicators.

[53]   Part of the system includes rewards pricing logic to efficiently measure and price the impact of rewards on consumer prepayment behavior. For example it would be most beneficial to a lender to reward the consumer for not prepaying the lender's loan. Such a reward could be assessed in terms of its impact on the consumer

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prepayment behavior. The system therefore permits the end-user to design pro forma rewards structures and to test their impact on prospective consumer prepayment behavior.

[54]   Various user definable screens also establish default spreads, prepayment spreads, broker commission schedules, and other financial factors that influence the pricing of the product to be offered to the consumer. Various other economic scenarios are collected via the user interface and combined with various probabilities and default data as well as other lender defined criteria result in rationally priced end-user mortgage contracts.

[55]   Referring to **Figure 3**, further information concerning the CEW of the present invention shown. The system comprises user interface module **70** which is the basic graphical user interface and other software that allows an originator to provide information concerning a consumer who wishes to borrow money from lender. The user interface module allows the collection of loan attributes **76**, applicant attributes **74**, and reward program attributes **72**. In addition user interface module **70** collects or calculates spreads, broker commissions and other costs associated with the loan **78**. Loan attributes **76** and other loan related costs are fed into pricing engine **84** which, with other information, assists in creating an appropriate loan price **86**.

[56]   Loan attributes **76**, applicant attributes **74**, and reward program attributes **72** all which have an impact on the value of the loan are fed into prepayment calculation server **80**. Prepayment calculation server **80** receives input from the various prepayment model parameters and creates prepayment score **82**.

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[57]   Referring to **Figure 4**, a block diagram showing the interactions which are

necessary to create a prepayment model are shown.   Consumer information

96 which consists of applicant attributes **74** and loan attributes **76** are fed into a

prepayment model fitting **92** module. Prepayment model fitting **92** establishes

various prepayment model parameters **94** based upon prepayment historical data **90**.

Once the appropriate prepayment model is created by prepayment model fitting **92**, a

model is returned to the prepayment calculation server for the calculation of the

prepayment score of the particular consumer given the type of loan to consumer is

requesting. The prepayment calculation server also benefits from input from an

econometric model scenario generator.

[58]   Referring to **Figure 5**, the interactions for the econometric model are shown.

Econometric model scenario generator **106** receives input from econometric model

fitting module **104** and LDS scenarios **108**. Econometric model fitting module **104**

receives information from econometric historical data **100** and current market

environment **102** which comprises, without limitation, information concerning rising

or falling interest rates and trends. The information from econometric historical data

100 concerns the demographic group to which the consumer belongs and other

econometric information such as age, income, cedit rating, occupation and other

factors. The information from current market environment **102** concerns the direction

and velocity of changes to interest rates. Econometric model scenario generator **106**

processes the information and produces various scenarios based on the information.

[59]   Referring again to **Figure 3**, prepayment calculation server **80** creates prepayment

score **44** for the particular consumer in question. Prepayment score **44** is based upon

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the established prepayment model and the generated econometric model. Prepayment score **44** is transmitted to the pricing engine **82** to establish the pricing of the loan product to be offered to the consumer in question.

[60]   Referring to **Figure 6**, additional parameters which the user interface module uses to create the various scenarios are shown. Additional aspects of the present invention provide for creation of new products. Strategy optimizer **122** is based upon acceptance of offered products by consumers and input from and relating to other products are on the market. Strategy optimizer **122** generates marketing plans based upon individual lenders' portfolios. Such a market plan could assist the lender in offering new products to the marketplace that are more profitable for the lender. The system includes targeting optimizer **124** which provides a way to offer loan products to those consumers having the most favorable prepayment characteristics, i.e., a low propensity to prepay loans made. The system also comprises loyalty optimizer **126** which models and defines offers and other inducements to consumers to reward financially advantageous consumer behavior. Channel optimizer **128** is part of the present invention. Channel optimizer **128** analyzes the channels of delivery of financial product offerings to evaluate and determine the channel that is · the most efficient way to deliver various financial products. The system also comprises database optimizer **130** which receives and organizes information in the various databases to constantly build and refined prepayment historical data **90** and econometric historical data **100**.

[61]   The target platform on which the system of the present invention will run is either an Intel Pentium processor based system with typically 32 megabytes of RAM, hard

disk storage and retrieval, and communications capability using the TCP/IP protocol. Alternatively the system will also run under the UNIX operating system on a Sun Solaris platform. In both cases displays for users are anticipated as is the ability to output hard copy reports. In typical operation, a plurality of users, remote from the system site will access the system via private networks or over the Internet to send the information necessary for the present invention to make the desired calculations leading to the prepayment score. This score is then sent back to the requesting user at the remote terminal.

[62]   Although described herein with respect to a mortgage loan or loan, the present invention is applicable to numerous financial instruments that have a value that depends on the particular consumer's actions over time. The value of typical debt instruments, such as, but not limited to, mortgages, second mortgages, home equity loans, car loans, school loans, term loans, leases, credit card accounts, and credit card balance transfers, depend on a continued stream of cash and are therefore affected significantly by prepayment.

[63]   The value of other instruments that depend on the cash stream over time, such as open-end car leases and whole-life insurance policies, can also depend on the consumer's actions, and therefore, for purposes of this invention can be considered as a form of debt instrument. In the car lease scenario, predicting the probability of a consumer electing to purchase or return the car before the end of the lease (prepay) is important in determining the value of the lease. Even a consumer's predisposition to keeping (purchasing at residual value price, a type of prepayment) or returning the car at the end of the lease can be used to modify the lease terms to the leasing entity's

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advantage.

[64]   Likewise, the likelihood of a consumer to cash out the surrender value of a whole-
life insurance policy (another form of prepayment, albeit in the opposite direction,
that ends the stream of cash) can significantly affect the ultimate value of the policy
to the insurer.

[65]   Known database and computer-based data mining techniques can be used for
analyzing: the value of financial instruments (and portfolios in which they are
packaged) based on the prepayment score associated with each of them; the risk
associated with portfolios containing the financial instruments; and the pricing for
servicing those portfolios. Additionally, instruments can be packaged together into
portfolios based, at least in part, on the prepayment scores of the applicants.

[66]   A system and method for prepayment score generation has been described. Those
skilled in the art will appreciate that other variations of the present invention are
possible without departing from the scope of the invention as described.

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WHAT IS CLAIMED IS:

[c1]   A system for determining a prepayment score representative of prepayment propensity of an individual applicant, comprising:

at least one debt instrument origination computer terminal for accepting and transmitting a debt instrument application of an individual applicant;

a computer network connected to the at least one debt instrument origination computer terminal for receiving the transmitted debt instrument application of the individual applicant;

a communication server connected to the computer network for receiving the transmitted debt instrument application of the individual applicant;

an application parser connected to the communications server for receiving the transmitted debt instrument application of the individual applicant from the communications server and parsing the information into debt instrument information and applicant information;

a prepayment model library database comprising debt instrument prepayment models connected to the application parser for receiving the debt instrument information and fitting the debt instrument information into the debt instrument prepayment models and for transmitting debt instrument prepayment models that match the debt instrument information; and

a prepayment calculation server comprising a prepayment score generation model connected to the prepayment model library database for receiving the debt instrument

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prepayment models and calculating a prepayment score for the debt instrument

application of the individual applicant based upon the debt instrument prepayment model

and the prepayment score generation model, the prepayment calculation server being

further adapted to transmit the prepayment score to at least one debt instrument

origination computer terminal via the communications server and the computer network;

where the prepayment score is calculated from the formula:

$$Score = \sum_T TP(T)$$

where T represents time and P represents prepayment; and

wherein the at least one debt instrument origination computer terminal is adapted

to use the prepayment score to adjust terms of the debt instrument of the individual

applicant.

[c2]   The system for determining a prepayment score of claim [c1], where the

        prepayment model library database further comprises:

        a model training server for creating the debt instrument prepayment models for

the prepayment model library database; and

        prepayment historical data storage means connected to the model training server,

the prepayment historical data further comprises prepayment statistics regarding debt

instruments of various types.

[c3]   The system for determining a prepayment score of claim [c1], where the

        prepayment calculation server further comprises an econometric model that

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generates Low Discrepancy Sequence (LDS)-based scenarios of econometric

parameters for input to the prepayment calculation server.

[c4]   The system for determining a prepayment score of claim [c1], further comprising

means adapted to calculate a total prepayment at time T from the formula:

$$P(T) = (1/S)\sum_{s=1}^{S} P_s(T)$$

where S represents the number of scenarios and P represents the prepayment

amount for a given scenario.

[c5]   The system for determining a prepayment score of claim [c4], further comprising

means adapted to calculate the total prepayment, accumulated by time, in scenario

s from the formula:

$$P_s(T) = \prod_t p_s(t_t)$$

where p(t) is a prepayment value.

[c6]   The system for determining a prepayment score of claim [c5], further comprising

means adapted to calculate the prepayment value in a given scenario from the

formula:

$$p_s(t) = \Re\ (A, L, E_s\ (t))$$

where A is the applicant's data, L is the debt instrument parameters, E is the

economic parameters and $\Re$ is an analytical prepayment model.

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[c7] The system for determining a prepayment score of claim [c1], where the applicant
       is either an individual consumer or an individual household.

[c8] The system for determining a prepayment score of claim [c1], further comprising
       computer-based means for using data associated with the prepayment score of the
       applicant and terms of the debt instrument to determine a calculation selected
       from the group consisting of: a value of the debt instrument, a value of a portfolio
       containing the debt instrument, a risk to holders of the debt instrument, and a
       price of a servicing contract for a portfolio containing said debt instrument.

[c9] A method for determining a prepayment score representative of prepayment
       propensity of an individual applicant, comprising:

       collecting debt instrument and applicant information at a debt instrument
originator;

       transmitting the debt instrument and applicant information over a network;

       receiving the debt instrument and applicant information at a service bureau;

       the service bureau calculating a prepayment score the individual applicant, where
the prepayment score is calculated from the formula:

$$Score = \sum_{T} TP(T)$$

       where T represents time and P represents prepayment;

       the service bureau returning the prepayment score over the network to the debt

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instrument originator; and

the debt instrument originator using the prepayment score to customize a debt

instrument product for the individual applicant.

[c10]   The method for determining a prepayment score of claim [c9], where calculating

a prepayment score for the applicant comprises parsing the information into debt

instrument information and applicant information.

[c11]   The method for determining a prepayment score of claim [c10], further

comprising providing the applicant information to a prepayment model library

database and the debt instrument information to a prepayment calculation server.

[c12]   The method for determining a prepayment score of claim [c11], further

comprising the prepayment model library determining the prepayment model that

best applies to the debt instrument information and providing that prepayment

model to the prepayment calculation server.

[c13]   The method for determining a prepayment score of claim [c12], further

comprising the prepayment calculation server receiving a prepayment model and

an econometric model, where the prepayment calculation server further calculates

a prepayment score for the applicant.

[c14]   The method for determining a prepayment score of claim [c13], where the total

prepayment at time T is calculated from the formula:

$$P(T) = (1/S)\sum_{s=1}^{S} P_s(T)$$

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where S represents the number of scenarios and P represents the prepayment

amount for a given scenario.

[c15] The method for determining a prepayment score of claim [c14], where the total

prepayment, accumulated by time, in scenario s is calculated from the formula:

$$P_s(T) = \prod_i p_s(t_i)$$

where p(t) is a prepayment value.

[c16] The method for determining a prepayment score of claim [c15], where the

prepayment value in a given scenario is calculated from the formula:

$$p_s(t) = \Re (A, L, E_s(t))$$

where A is the applicant's data, L is the debt instrument parameters, E is the

economic parameters and $\Re$ is an analytical prepayment model.

[c17] The method for determining a prepayment score of claim [c9], where the

applicant is defined as an individual consumer or an individual household.

[c18] The method for determining a prepayment score of claim [c9], further comprising

rating a broker based on prepayment scores of applicants that are clients of said

broker.

[c19] The method for determining a prepayment score of claim [c9], further comprising

using the prepayment score of the applicant and terms of the debt instrument to

assist in determining a calculation selected from the group consisting of: a value

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of the debt instrument, a value of a portfolio containing the debt instrument, a risk to holders of the debt instrument, and a price of a servicing contract for a portfolio containing said debt instrument.

[c20]   The method for determining a prepayment score of claim [c9], further comprising packaging said debt instrument into a portfolio based, at least in part, on the prepayment score of the applicant.

Abstract of the Disclosure

A method and apparatus is disclosed for determining the prepayment propensity of individual borrowers. Early payment of debt instruments, such as loans and leases, can lead to losses being suffered by lenders. The present invention analyzes the demographics associated with a particular borrower to determine both the individual and group based prepayment propensity. The history of the borrower, the history of the borrower's demographic group, interest rate trends and other factors are then used to calculate a prepayment score that can be used by the lender to determine the propensity of a given borrower to prepay the instrument in question. The score of the individual borrower can be used to estimate the profitability of a debt instrument and allow the lender to make appropriate adjustments prior to issuing the instrument. The individual prepayment scores of a lender's or broker's clients can also be used to rate the lender or broker.
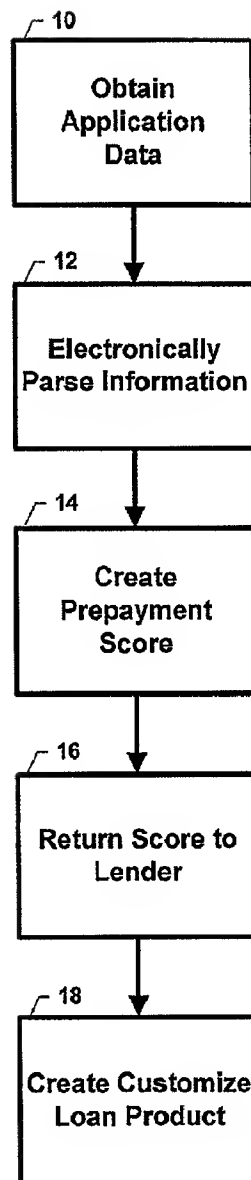
FIGURE 1

FIGURE 2

FIGURE 3

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**Prepayment
Historical Data**

90

Prepayment Model Fitting

92

**Prepayment
Model
Pararmeters**

94

**Consumer
Information**

(A)

(B)

FIGURE 4

100

Econometric
Historical Data

102

Current Market
Environment

104

Econometric Model Fitting Module

106

Econometric
Model Scenario
Generator

50

LDS

108

Scenarios

(C)

(D)

FIGURE 5

FIGURE 6

DECLARATION - USA PATENT APPLICATION

As a below named inventor, I hereby declare that:
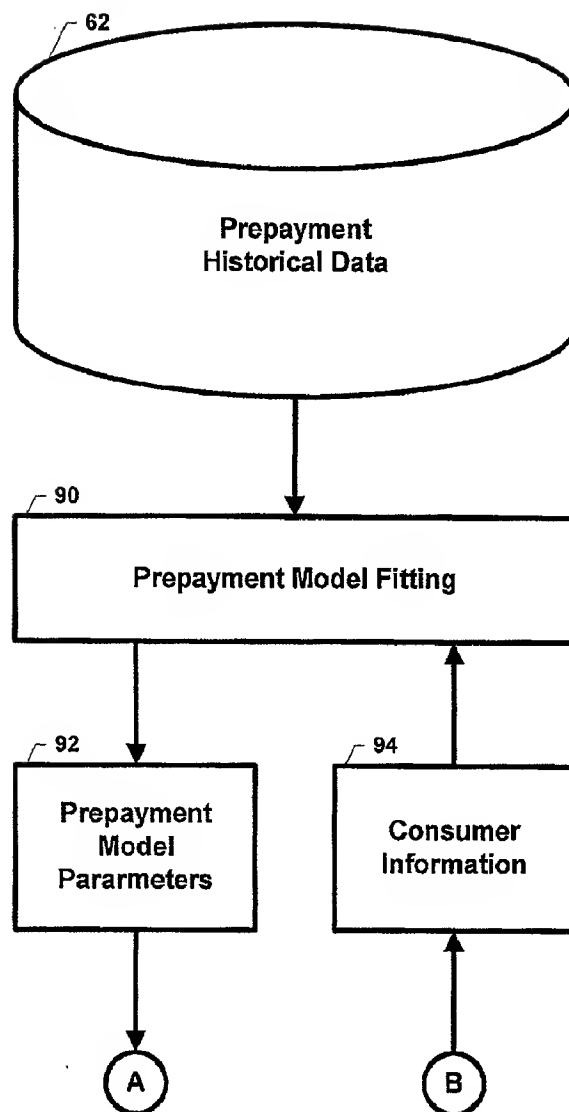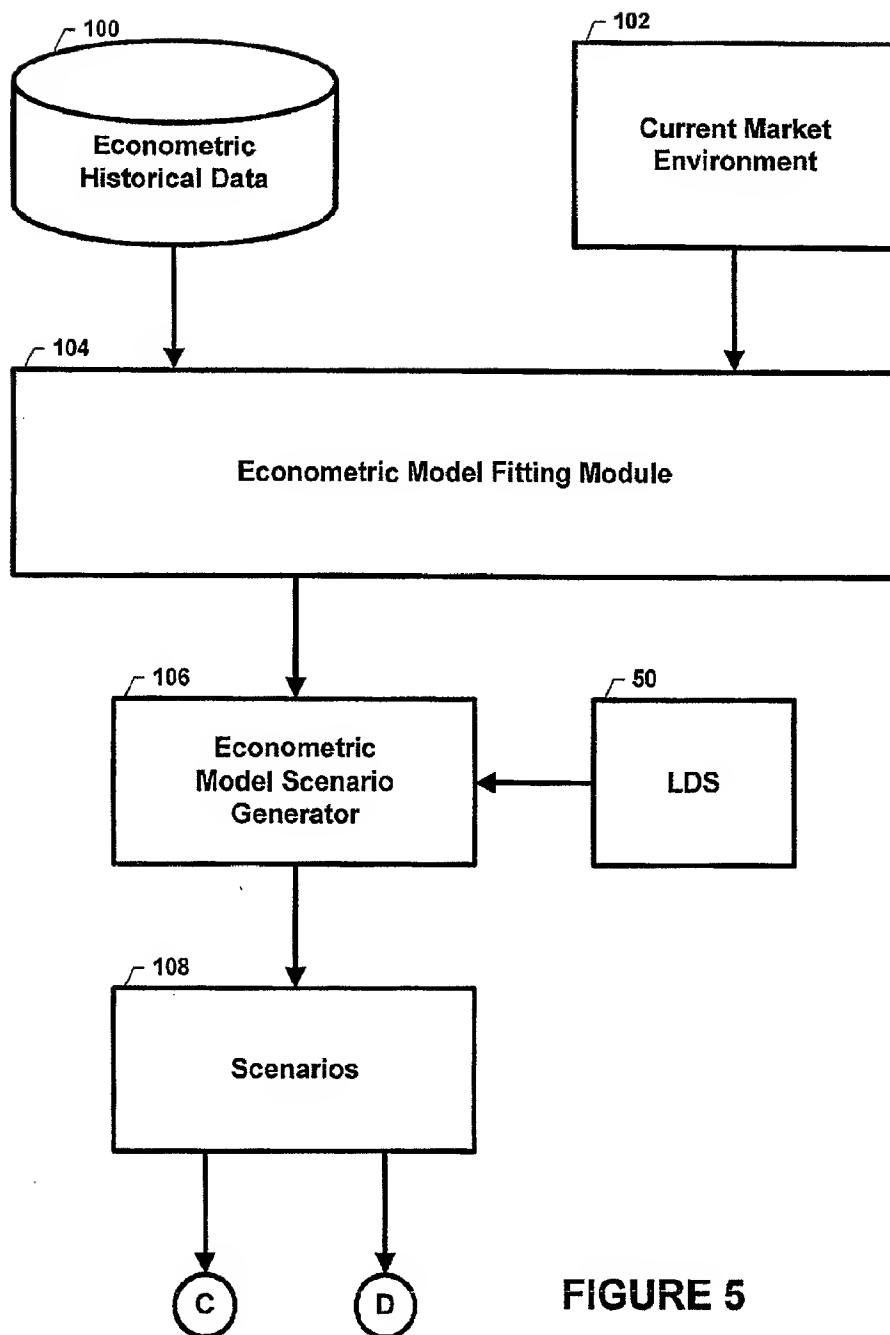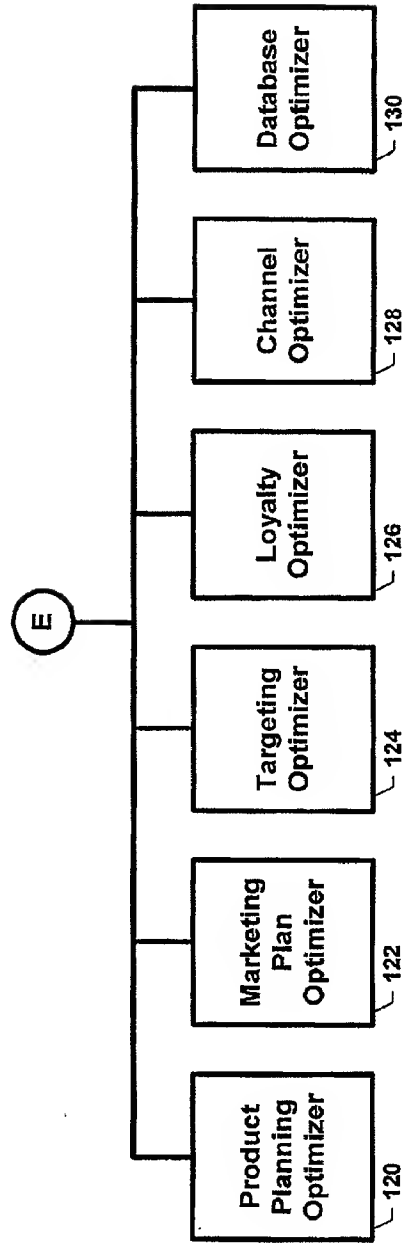
My residence, mailing address and citizenship are as stated below next to my name;

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled **METHOD AND APPARATUS FOR DETERMINING A PREPAYMENT SCORE FOR AN INDIVIDUAL APPLICANT**; the specification of which was filed on August 30, 2001 as Application Serial No. 09/942,983.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above;

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56;

I hereby claim the benefit under Title 35, United States Codes § 119(e) of any United States provisional application(s) listed below.

Application No.: 60/228,954   Filing Date: August 31, 2000

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful, false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of first inventor: **Yuri Galperin**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: USA

Mailing Address: same as above

Full name of Second inventor: **Vladimir Fishman**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: USA

Mailing Address: same as above

Full name of Third inventor: **William A. Eginton**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: USA

Mailing Address: same as above

Full name of Fourth inventor: **Charles L. Jones III**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: _____

Mailing Address: same as above

Send Correspondence To:
KNOBBE, MARTENS, OLSON & BEAR, LLP
Customer No. 20,995

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Yuri Galperin, et al.
Appl. No.	:	09/942,983
Filing Date	:	Augusts 30, 2001
For	:	METHOD AND APPARATUS FOR DETERMINING A PREPAYMENT SCORE FOR AN INDIVIDUAL APPLICANT
Examiner	:	Siegfried E. Chencinski
Group Art Unit	:	3692

CONSENT OF ASSIGNEE TO CORRECT INVENTORSHIP UNDER 37 C.F.R. § 1.48(a)(5)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The undersigned is empowered to act on behalf of the Assignee of the above-referenced application. The Assignee represents that it is the 100% owner of the above-referenced application by virtue of assignments, copies of which are attached hereto. The Assignee hereby consents to the addition of the following inventor to the above-captioned application:

Charles L. Jones III

Dated: _____   By: _____

                                        Name: _____

                                        Title: _____

                                        MARKETSWITCH CORPORATION

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EXHIBIT D

Kathy.Collins

From:	Meltzer, Laura [Laura.Meltzer@experian.com]
Sent:	Thursday, September 06, 2007 1:16 PM
To:	drew@eginton.net
Subject:	Patent Matter
Attachments:	EXP.046A Application as filed.pdf; 2007-08-02 Declaration-w_4inventors EXP.046A.DOC; Consent of Assignee To Correct Inventorship.DOC

Hi, Drew.

The attorney has asked me to attempt to reach you one last time. They need these documents signed because:

> Marketswitch filed patent applications in 1998 and 2001 for a prepayment score model that you co-invented. We have become aware that the 2001 application incorrectly does not list Charles Jones as an inventor. We want to correct this so that Charles will correctly be listed as an inventor. To make this correction, we need each inventor to sign a declaration to acknowledge that each of the four inventors, including Charles, contributed to the invention.

The documents to be signed are attached. Your name appears on page 2 of the Declaration. And you would sign the Consent of Assignee as an officer of Marketswitch. If you want to FedEx the signed docs back to me, you can use account number 2165 1769 5, and Experian will pay.

Thank you.

Laura Meltzer
Executive Assistant

Experian Decision Analytics—Americas

2350 Corporate Park Drive
Suite 400
Herndon, Virginia

Tel: 571/434.4232
Fax: 703/444.6812

9/19/2007

SPECIFICATION

TITLE: METHOD AND APPARATUS FOR DETERMINING A
PREPAYMENT SCORE FOR AN INDIVIDUAL APPLICANT

RELATED APPLICATIONS

[01]   This application claims the benefit of Provisional Application Serial No.

60/228,954, filed August 31, 2000, which is incorporated herein in its entirety.

FIELD OF THE INVENTION

[02]   This invention relates generally to receiving applications for and processing of

lending transactions. More specifically this invention provides a method and

apparatus to assess the prepayment propensity of a borrower in the form of a

prepayment "score" to enable assessment of (i) the value of mortgages, second

mortgages, home equity loans or other debt instruments for investors, (ii) the value

of credit card accounts and balance transfers, (iii) the value of term loans and leases,

(iv) the behavior of brokers with respect to churning, (v) the valuation of existing

portfolios, (vi) the risk management of institutions that hold debt instruments, and

(vii) the pricing of mortgage portfolio servicing contracts.

BACKGROUND OF THE INVENTION

[03]   By way of an introductory example, consider the most common of debt

instruments, the consumer mortgage. The value of a mortgage depends, in large part,

on the duration of the mortgage. At the inception of the mortgage there are broker

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fees and various other settlement costs that are charged to the lender. When a mortgage extends for the term of many years, there is an opportunity for the lender to recoup costs of putting a mortgage in place for a given consumer and to make profit on that mortgage. This is particularly important for all business organizations that lend money, but it is particularly important for those mortgage financing organizations which have stockholders and other investors.

[04]   When a mortgage loan is paid off early due to refinancing, depending upon how early in the term, the mortgage loan is paid off, there is the possibility that the lending institution can actually take a loss on the particular mortgage. The rate of prepayment depends on a number of objective factors. For example, during times of decreasing mortgage rates, on average, more consumers refinance their home loans than would otherwise occur, in order to obtain a lower monthly payment. However, for a given macroeconomic environment and other measurable, objective factors, each consumer evidences an individual propensity to prepay a loan. This prepayment propensity reflects the consumer's demographic and other objective attributes. A system that can assess such individual prepayment behavior by a consumer in advance of the loan will lead to more profitable loans being made, and hence the enhanced availability of funds for loans to more consumer-borrowers. The present invention therefore may be applied, without limitation, to a) the pricing of mortgages and other debt instruments, b) the valuation of existing portfolios of debt instruments, and c) the risk management of institutions that hold debt instruments.

[05]   Additionally, the present invention is not limited to the type of debt instrument or lending transaction to which the prepayment score is useful. The invention includes,

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but is not limited to, mortgages (consumer and commercial), second mortgages, refinanced mortgages, consumer loans, commercial loans, asset-backed loans, consumer leases, commercial leases, credit card accounts, credit card balance transfers, debt consolidation loans (term notes, etc.), mortgage-backed securities (i.e., mortgage pass through, CMO's, mortgage-backed bonds, principal-only, interest-only, etc.), and any servicing contract for these lending transactions that performs financially based on the quality (i.e., duration) of the cash flow.

[06]   A further element of the present invention is the monitoring and scoring of brokers for these lending transactions. Mortgage brokers deal with both consumer-borrowers and lenders-clients. In order to generate brokerage fees, it is possible for a broker to encourage its consumer-borrowers to refinance their mortgages frequently and prematurely. When this occurs, the mortgage broker generates a fee for the broker, however, early prepayment of the prior mortgage instrument can result in a loss for the lender. Thus the present invention also has the capability to score mortgage broker prepayment behavior.

[07]   The behavior of a broker is sometimes not all heinous. Sometimes a consumer, who is particularly attuned to the rise and fall of interest rates, will simply be the one who changes mortgage instruments more frequently than the average consumer. The broker who is scored based upon the prepayment behavior of the consumers that the broker brings to lenders, would like to know the pre-payment propensity for the given consumer. This would be useful so that the mortgage broker can optimize the broker's relationship with its lender-clients by only bringing consumer-borrowers who have a low prepayment propensity.

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[08]   Therefore, lenders and brokers badly need the ability to better measure

prepayment behavior in advance of incurring marketing or underwriting charges;

these expenses are too great to absorb blindly on behalf of consumers with poor

prepayment propensities. Indeed, a beneficial use of the invention would be in

managing the initial marketing effort itself. For example, only those customers who

can be shown to score favorably for prepayment behavior might receive a solicitation

for a mortgage product A. Consumers who are revealed to represent a substantial

prepayment risk may be offered a more suitable mortgage product B, reflecting the

increased risk. In this way, enhanced customers segmentation and product design

initiatives converge to benefit consumers and their sources of debt financing, to the

benefit of each.

[09]   To understand the potential impact of national prepayment scoring standard, as

manifested in the present invention, one need look no farther than the existing

default risk scoring standard, owned and distributed by Fair, Isaac and Company,

Inc. (Fair Isaac) for over 30 years. By establishing a standard methodology for

scoring borrower default risk, and broadly disseminating it, Fair Isaac dramatically

enhanced mortgage lender insight into expected loan dynamics. In finance,

enhanced insight is synonymous with enhanced information. Enhanced information

implies reduced risk for the lender. Finally, reduced lender risk profiles produce

lower costs of capital. In other words, because Fair Isaac standardized successfully a

fungible measurement of default risk, more money is available for consumers to

borrow, at better and cheaper interest rates. The market is more efficient than before

and everyone benefits.

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[10]   To further qualifying the timeliness of the invention, please refer to exhibit 1,

"Green Tree chief returns $23 million..." The Wall Street Journal, March, 1998. This

story highlights the industry wide uncertainty surrounding prepayment speeds in

consumer debt portfolios. One industry leading company, Green Tree Financial, "has

been hit hard the past year by escalating loan losses in the painful recognition that its

accounting has been too aggressive. Also, an unexpected wave of loan prepayments

hit the industry, as borrowers sought lower interest rates, indicating working-class

consumers were not as unsophisticated as lenders had believed." Stated plainly,

Green Tree overstated prior year earnings significantly, exercising its option under

GAAP accounting to roll forward and capture in advance projected lending profits,

even though those very profits were merely estimated based in part on arbitrary

prepayment assumptions. In large measure because Green Tree badly miscalculated

these prepayments speed assumptions, in 1997 the company was forced to charge off

$390 million of 1996 reported profit. In 1998 the company was sold off to Conseco.

[11]   Earlier disclosures in the area of prepayment scoring in a lending context are

limited or nonexistent. United States Patent No. 5,696,907, entitled "System and

Method for Performing Risk and Credit Analysis of Financial Service Applications,"

issued to Tom. The Tom patent discloses using a neural network to mimic a loan

officer's underwriting decision making. The method of the Tom patent is based on a

non-iterative regression process that produces an approval criterion that is useful in

preparing new or modified underwriting guidelines to increase profitability and

minimize losses for a future portfolio of loans. A prepayment observation is used in

the neural net as a negative flag, but no prepayment scoring system is utilized in the

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Tom patent.

[12]   In view of the prior art, there is a clear need for measuring and predicting a

consumer's prepayment propensity, as well as a clear and strong need for a method

and apparatus to produce such a measuring and predictive parameter.

BRIEF SUMMARY OF THE INVENTION

[13]   The system and method of the present invention generally works in the following

manner: the service bureau or broker will electronically capture individual loan

applications from consumers. Those loan applications will be sent to lenders for

evaluation. The lender, using the present invention submits the loan application for

review and analysis. The loan application will be reviewed by the present invention

according to a sophisticated economic and customer behavior model, which will

score the prepayment behavior of candidate borrowers. The score for these

borrowers, which is an index of their prepayment propensity, will be electronically

returned to the lender. The lender will in turn use the prepayment score and calibrate

an appropriate mortgage price including the setting of interest rates, fees, broker

commissions, and potentially consumer rewards. Using this consumer scoring

technique, a lending institution can seek to contact or contract with those consumers

who display a low propensity to prepay.

[14]   The advanced scoring of customer prepayment propensities materially improves

the lender's to risk profile as regards new lending customers. This novel insight adds

value to the marketing, underwriting, lending, administrative process for first and

second mortgages, credit card balance transfers, and asset-backed term loans such as

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automobile loans. By assisting lenders in their efforts to segment customers according to this crucial behavior metric, waste and excess costs are driven from the lending economy. More money is thus available, more cheaply, for more people.

[15]   To the borrower, this system offers several advantages. First, more favorable loan terms can be made to those consumers who exhibit a beneficial borrowing behavior, i.e., borrowers who are not likely to prepay their loans but instead maintain their loans for a profitable duration. Further, dealing with a stable borrower market results in a more favorable financial environment on for all lenders thereby mitigating the risk of loss and, in the normal course of all efficient markets, passing that financial advantage onto borrowers generally.

[16]   Once again, the irrefutable economic relationship between financial risk-taking and expected financial reward informs the environment addressed by the present invention. If lenders reduce their risks-and by extension their costs-through enhanced prepayment scoring, ultimate borrowing costs paid by consumers will decline.

[17]   For the loan originator, the system offers several advantages. The loan originator can more efficiently price the particular loan. Further the loan originator can more efficiently select brokers and intermediaries who will select the best borrowers. Further, the system and method of the present invention will lead to more efficient direct and indirect marketing investments by identifying individual consumers and groups of consumers who exhibit the most beneficial borrowing behavior, i.e., a propensity not to prepay financial obligations.

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[18]   Given that direct marketing costs are exploding as the conventional direct

channels (e.g. mail and outbound telemarketing) become saturated, any available

efficiency in the direct marketing process is highly desirable. For example, in the

marketing of home equity lines of credit (i.e. second mortgages), direct-mail

response rates are now, on average, running below 0.3% (i.e. below 3/10ths of one

percent). Obviously, some fraction of even this small respondent sample will prove

ill-suited, as regards prepayment behavior, for the debt product being marketed.

Therefore, the tailoring of specific debt products to consumers of specific

prepayment behavior characteristics is essential to the efficient pricing of debt

instruments. Lead generation, third-party data acquisition, underwriting, yield

spread calculations all directly inform debt instrument profitability, and are all

beneficially affected by the present invention.

[19]   Finally, in the context of sophisticated asset liability management (ALM), subtle

prepayment behavior analysis provides significant benefits to its practitioners.

Because ALM, as a primary objective, seeks to minimize destructive asymmetries in

asset and liability cash flows, intelligent risk managers will utilize debt contracts of

varying expected durations to strengthen their balance sheet. For example, a lender's

risk manager may seek multiple classes of debt instrument, reflecting multiple

prepayment profiles, in order to assure himself of adequate incoming cash flow to

sustain his expected liability cash outflows. In the matching, therefore, of expected

cash in- and out-flows, the prudent risk manager utilizes a carefully segmented

portfolio of debt instruments scored by prepayment propensities (and other meaures)

and priced accordingly, to avert liquidity crises.

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[20]   An additional, equally valuable use of the present invention is in the valuation of

existing mortgage or debt instrument blocks of business. This valuation may be

required by lender risk managers, auditors, regulators, or investors; it may reflect

stakeholder interest in actively managing asset-liability risk, or it may be performed

as part of the merger and acquisition appraisal. In all instances, the prepayment

scoring system quantifies from a granular perspective upward to a pool, or block

perspective, the prepayment speed characteristics of the debt instruments. As we

have seen in the Green Tree case, failing to adequately price prepayment risk has

enormous balance sheet implications, and typically leads one to grossly over value a

portfolio or the enterprise itself.

[21]   For auditors, the system of the present invention offers a quantitative measure of

prepayment risk thus reducing auditor exposure to "claw-back" write-downs. This

situation occurs in the case of issuers that secure these mortgages and, under the

generally applied accounting procedures (GAAP) accelerate and capture earnings

based on certain prepayment assumptions. If those prepayment assumptions are

incorrect, prior year financial statements are incorrect and massive charges are

required to reflect lower portfolio earnings.

[22]   For banking regulators, the system of the present invention offers the ability to

quantify balance sheet risk resulting from expected consumer prepayment behavior.

This will allow regulators to more precisely measure and assign minimum bank

capital levels.

[23]   For credit rating agencies, the ability to score according to an objective, standard

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methodology prepayment risk provides enormous assistance in rating a lender's creditworthiness. Rating agencies function, effectively, as credit market bellweathers. Lending institutions are dependent on favorable credit ratings in order to float their institutional debt at advantageous rates; rating agencies, as in the case of regulators, evaluate carefully lenders' claims of capital adequacy; the capital (cash reserves) retained by lenders is directly and immediately affected by debt instrument prepayment speeds. This is because, under GAAP accounting rules, lenders are allowed to capture a substantial percentage of the future expected profits for a given contracted debt instrument, and those profits are themselves substantially dependent on the assumed life of the instrument. (In the case of subprime mortgages, for example, profits may double if the mortgage is maintained in force for four years instead of three). If those profits are overstated, they must be reversed, with resultant charges reducing lender capital (capital: paid-in cash investments plus retained profits). Therefore, rating agencies must scrutinize lender portfolio prepayment speed assumptions, because if those assumptions prove false, then the lender will suffer a reduction in capital. Any significant impairment of lender capital necessarily suggests a reduction in its credit rating. Credit rating agencies will be major beneficiaries and users of the present invention.

[24] For investment bankers, the system of present invention establishes a standardized prepayment methodology that allows merger and acquisition advisers to be able to quantitatively measure the balance sheet risk in a target banking or mortgage company. In addition, investment bank usage of the present invention will include its application to debt instrument securitization. Securitization describes the process

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by which pools of mortgage or other debt instruments are purchased by investment

banks-in their capacity as underwriters-and re-sold to institutional and public

investors as reconstituted securities. Typically, these securitizations benefit

originators of debt, because they realize significant acceleration in realized profits;

they also significantly diversify their risks by selling significant aspects of the debt

instrument to asset underwriters and others. However, the typical debt instrument

securitization proceeds with the originating lender retaining significant prepayment

risk; if prepayment speeds accelerate beyond levels assumed in the securitization

pricing process, the originating lender is held responsible. Hence the invention, by

measuring the expected prepayment behavior and scoring in according to an

accepted, industry standard method, will improve the securitization process and

render it more efficient. Once again, this will reduce costs for all participants and

free up more capital for lower-cost consumer borrowing.

[25]   For investors, the method of the present invention provides a way to make

investment decisions based upon quantified debt instrument prepayment behavior

risk for lending institutions in which investors might want to invest, or to evaluate

the relative stability of mortgage securities that are backed by individual debt

instruments.

[26]   These and other advantages of the present invention are described in reference to

the specification that follows.

BRIEF DESCRIPTION OF THE DRAWINGS

[27]   **Figure 1** is an overview of the process of the present invention.

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[28]   **Figure 2** is a block diagram of the present invention.

[29]   **Figure 3** is a block diagram showing the user interface module connections.

[30]   **Figure 4** is block diagram showing the interactions with the prepayment historical data.

[31]   **Figure 5** is a block diagram showing the interactions with the econometric model.

[32]   **Figure 6** is a block diagram showing the factors that are used by the user interface module.

DETAILED DESCRIPTION OF THE INVENTION

[33]   Referring to **Figure 1**, an overview of the process of the present invention is shown. The mortgage broker or lending institution first obtains a loan application from a borrower **10**. That information is electronically transmitted to the present invention, which parses the information **12** of the loan application into various categories that are relevant to the scoring of the potential loan. The loan application contents are parsed based upon the information needs of a sophisticated, mathematical model resident in the present invention. A prepayment score is then derived **14** for the particular consumer as a function of the particular loan type being requested, and in further view of the interest rate environment in which the loan is being processed (i.e. rising or falling interest rates). As previously noted this score is an indication of the prepayment propensity of a particular consumer. The prepayment score is then returned to the lender **16**. Thereafter the lender can create a customized loan product that rewards favorable prepayment behavior of the

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consumer **18**.

[34]   Referring to **Figure 2**, an overview of the system of the present invention is

shown. A loan originator **20** receives the application from a potential consumer.

That application is then input to the loan originator's data delivery channels **22**. Such

data delivery channels **22** are (without limitation) e-mail, fax, Internet, and generally

other electronic means. Other loan originators **34** also send their respective

consumer applications over their own data delivery channels **36**.

[35]   The present invention anticipates delivery of loan applications **24** over the

Internet **28** or other digital electronic means such as wireless communications

methods as well. Electronic loan applications **40** enter the system of the present

invention through a communication server **42**. The loan information concerning a

given consumer is then submitted to an application parser **52**. Application parser **52**

divides the information into loan information **58** and applicant information **56**. Loan

information **58** is information that relates to the amount, the term, down payment,

loan type, and other information important and relating to the amount of money to be

loaned. Applicant information **56** is information such as name, address, Social

Security number, and other demographic information concerning the applicant.

[36]   Loan information **56** is fed into a prepayment model library database **66**. The

prepayment model library database **66** comprises information concerning

prepayment historical data **62**. The results are fed into model training server **64**

which processes prepayment historical data **62** of both an individual and

demographic groups which in turn provides updates to the model library database **66**.

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Once loan information **58** is processed by the prepayment model library database **66** an analytical prepayment model **60,** which is based upon the loan information **58 is** provided to the prepayment calculation server **46.** Prepayment calculation server **46** receives additional information from econometric model **48** which establishes the relationship among the wide variety of variables. Econometric model **48** generates interest rate, mortgage rate and other economic parameters that, arrayed in time series, comprise scenarios utilized by the prepayment calculations server. These scenarios are generated from the Low Discrepancy Sequence (LDS) logic, rather than using random number generation. The LDS logic affords significantly higher model accuracy with the same number of scenarios.

[37]   Once a prepayment score 44 is derived by prepayment calculation server **46,** prepayment score **44** is sent to the communication server **42** and is transmitted over the Internet (or other electronic channels) **28** through the data delivery channels **22** or **36** back to loan originators **20** or **34** who can then either approve, disapprove, or create customized loan product for the consumer.

[38]   Prepayment score **38** is calculated based upon the following model. The specific prepayment analysis of the present invention is conceptually shown below.

[39]   The following variables:

[40] $A = (a_1, a_2, ..., a_n)$

[41] $L = (l_1, l_2, ..., l_m)$

[42]   are vectors of the applicant's data and loan parameters.

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[43] $E_s(t) = (e_{1s}(t), e_{2s}(t), \ldots e_{ks}(t)); \quad s = 1, \ldots, S$

[44]   denotes a set of Low Discrepancy Sequence (LDS)-based scenarios of the

econometric parameters, which have been generated by the RTH Linked Index

Econometric Model. Thus the model is a set of stochastic differential equations that

describe the dynamics and interaction of major macroeconomic indicators, each

relevant to the prepayment propensity calculation.

[45]   Analytical Prepayment Model $\Re$, which varies with the types of loan applied for,

is trained to calculate prepayment value p_s in a given scenario based on the

applicant's data (A), loan parameters (L), and econometric parameters (E):

$$p_s(t) = \Re\,(A, L, E_s\,(t))$$

[46]   Total prepayment, accumulated by the time T in scenario s, can be calculated as:

$$P_s(T) = \prod_t p_s(t_t)$$

[47]   Then, total prepayment at time T is given by:

$$P(T) = (1/S) \sum_{s=1}^{s} P_s(T)$$

[48]   Finally, the prepayment score is:

$$Score = \sum_T TP(T)$$

[49]   The analytical model that produces the prepayment score may be further informed

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by additional external behavioral or econometric factors, based on subsequent research, as well as the aforementioned behavioral scoring of mortgage broker behavior.

[50]   The present invention may also be represented in an alternative embodiment in the form of the credit engineering workstation (CEW). This CEW (more fully described below) comprises a user interface which allows a loan originator to conduct all of the prepayment calculations, model analysis, and pricing of the present invention using the prepayment model first noted above.

[51]   The CEW operates in either a Unix or Windows NT environment using Oracle, SQL server, Sybase, DB2, or Informix database support. The CEW also uses CORBA or, structured object models together with a JAVA/HTML browser based graphical user interface.

[52]   The subroutines of the CEW all contribute to the end goal of determining the prepayment propensity of a consumer. For example, subroutines of the present invention deal supports the generation of various interest rate scenarios, and subsequent economic scenarios model fitting processes that fit the modeled interest rates scenarios to historical and current interest rate yield curve performance as well as to other macro economic indicators.

[53]   Part of the system includes rewards pricing logic to efficiently measure and price the impact of rewards on consumer prepayment behavior. For example it would be most beneficial to a lender to reward the consumer for not prepaying the lender's loan. Such a reward could be assessed in terms of its impact on the consumer

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prepayment behavior. The system therefore permits the end-user to design pro forma

rewards structures and to test their impact on prospective consumer prepayment

behavior.

[54]   Various user definable screens also establish default spreads, prepayment spreads,

broker commission schedules, and other financial factors that influence the pricing of

the product to be offered to the consumer. Various other economic scenarios are

collected via the user interface and combined with various probabilities and default

data as well as other lender defined criteria result in rationally priced end-user

mortgage contracts.

[55]   Referring to **Figure 3**, further information concerning the CEW of the present

invention shown. The system comprises user interface module **70** which is the basic

graphical user interface and other software that allows an originator to provide

information concerning a consumer who wishes to borrow money from lender. The

user interface module allows the collection of loan attributes **76**, applicant attributes

74, and reward program attributes **72**. In addition user interface module **70** collects

or calculates spreads, broker commissions and other costs associated with the loan

78. Loan attributes **76** and other loan related costs are fed into pricing engine **84**

which, with other information, assists in creating an appropriate loan price **86**.

[56]   Loan attributes **76**, applicant attributes **74**, and reward program attributes **72** all

which have an impact on the value of the loan are fed into prepayment calculation

server **80**. Prepayment calculation server **80** receives input from the various

prepayment model parameters and creates prepayment score **82**.

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[57]   Referring to **Figure 4**, a block diagram showing the interactions which are

        necessary to create a prepayment model are shown. Consumer information

        96 which consists of applicant attributes **74** and loan attributes **76** are fed into a

        prepayment model fitting **92** module. Prepayment model fitting **92** establishes

        various prepayment model parameters **94** based upon prepayment historical data **90**.

        Once the appropriate prepayment model is created by prepayment model fitting **92,** a

        model is returned to the prepayment calculation server for the calculation of the

        prepayment score of the particular consumer given the type of loan to consumer is

        requesting. The prepayment calculation server also benefits from input from an

        econometric model scenario generator.

[58]   Referring to **Figure 5**, the interactions for the econometric model are shown.

        Econometric model scenario generator **106** receives input from econometric model

        fitting module **104** and LDS scenarios **108**. Econometric model fitting module **104**

        receives information from econometric historical data **100** and current market

        environment **102** which comprises, without limitation, information concerning rising

        or falling interest rates and trends. The information from econometric historical data

        100 concerns the demographic group to which the consumer belongs and other

        econometric information such as age, income, cedit rating, occupation and other

        factors. The information from current market environment **102** concerns the direction

        and velocity of changes to interest rates. Econometric model scenario generator **106**

        processes the information and produces various scenarios based on the information.

[59]   Referring again to **Figure 3**, prepayment calculation server **80** creates prepayment

        score **44** for the particular consumer in question. Prepayment score **44** is based upon

the established prepayment model and the generated econometric model. Prepayment score 44 is transmitted to the pricing engine 82 to establish the pricing of the loan product to be offered to the consumer in question.

[60]   Referring to **Figure 6**, additional parameters which the user interface module uses to create the various scenarios are shown. Additional aspects of the present invention provide for creation of new products. Strategy optimizer **122** is based upon acceptance of offered products by consumers and input from and relating to other products are on the market. Strategy optimizer **122** generates marketing plans based upon individual lenders' portfolios. Such a market plan could assist the lender in offering new products to the marketplace that are more profitable for the lender. The system includes targeting optimizer **124** which provides a way to offer loan products to those consumers having the most favorable prepayment characteristics, i.e., a low propensity to prepay loans made. The system also comprises loyalty optimizer **126** which models and defines offers and other inducements to consumers to reward financially advantageous consumer behavior. Channel optimizer **128** is part of the present invention. Channel optimizer **128** analyzes the channels of delivery of financial product offerings to evaluate and determine the channel that is the most efficient way to deliver various financial products. The system also comprises database optimizer **130** which receives and organizes information in the various databases to constantly build and refined prepayment historical data **90** and econometric historical data **100**.

[61]   The target platform on which the system of the present invention will run is either an Intel Pentium processor based system with typically 32 megabytes of RAM, hard

disk storage and retrieval, and communications capability using the TCP/IP protocol. Alternatively the system will also run under the UNIX operating system on a Sun Solaris platform. In both cases displays for users are anticipated as is the ability to output hard copy reports. In typical operation, a plurality of users, remote from the system site will access the system via private networks or over the Internet to send the information necessary for the present invention to make the desired calculations leading to the prepayment score. This score is then sent back to the requesting user at the remote terminal.

[62]   Although described herein with respect to a mortgage loan or loan, the present invention is applicable to numerous financial instruments that have a value that depends on the particular consumer's actions over time. The value of typical debt instruments, such as, but not limited to, mortgages, second mortgages, home equity loans, car loans, school loans, term loans, leases, credit card accounts, and credit card balance transfers, depend on a continued stream of cash and are therefore affected significantly by prepayment.

[63]   The value of other instruments that depend on the cash stream over time, such as open-end car leases and whole-life insurance policies, can also depend on the consumer's actions, and therefore, for purposes of this invention can be considered as a form of debt instrument. In the car lease scenario, predicting the probability of a consumer electing to purchase or return the car before the end of the lease (prepay) is important in determining the value of the lease. Even a consumer's predisposition to keeping (purchasing at residual value price, a type of prepayment) or returning the car at the end of the lease can be used to modify the lease terms to the leasing entity's

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advantage.

[64]   Likewise, the likelihood of a consumer to cash out the surrender value of a whole-
life insurance policy (another form of prepayment, albeit in the opposite direction,
that ends the stream of cash) can significantly affect the ultimate value of the policy
to the insurer.

[65]   Known database and computer-based data mining techniques can be used for
analyzing: the value of financial instruments (and portfolios in which they are
packaged) based on the prepayment score associated with each of them; the risk
associated with portfolios containing the financial instruments; and the pricing for
servicing those portfolios. Additionally, instruments can be packaged together into
portfolios based, at least in part, on the prepayment scores of the applicants.

[66]   A system and method for prepayment score generation has been described. Those
skilled in the art will appreciate that other variations of the present invention are
possible without departing from the scope of the invention as described.

WHAT IS CLAIMED IS:

[c1]   A system for determining a prepayment score representative of prepayment

propensity of an individual applicant, comprising:

at least one debt instrument origination computer terminal for accepting and

transmitting a debt instrument application of an individual applicant;

a computer network connected to the at least one debt instrument origination

computer terminal for receiving the transmitted debt instrument application of the

individual applicant;

a communication server connected to the computer network for receiving the

transmitted debt instrument application of the individual applicant;

an application parser connected to the communications server for receiving the

transmitted debt instrument application of the individual applicant from the

communications server and parsing the information into debt instrument information and

applicant information;

a prepayment model library database comprising debt instrument prepayment

models connected to the application parser for receiving the debt instrument information

and fitting the debt instrument information into the debt instrument prepayment models

and for transmitting debt instrument prepayment models that match the debt instrument

information; and

a prepayment calculation server comprising a prepayment score generation model

connected to the prepayment model library database for receiving the debt instrument

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prepayment models and calculating a prepayment score for the debt instrument

application of the individual applicant based upon the debt instrument prepayment model

and the prepayment score generation model, the prepayment calculation server being

further adapted to transmit the prepayment score to at least one debt instrument

origination computer terminal via the communications server and the computer network;

where the prepayment score is calculated from the formula:

$$Score = \sum_{T} TP(T)$$

where T represents time and P represents prepayment; and

wherein the at least one debt instrument origination computer terminal is adapted

to use the prepayment score to adjust terms of the debt instrument of the individual

applicant.

[c2]   The system for determining a prepayment score of claim [c1], where the

prepayment model library database further comprises:

a model training server for creating the debt instrument prepayment models for

the prepayment model library database; and

prepayment historical data storage means connected to the model training server,

the prepayment historical data further comprises prepayment statistics regarding debt

instruments of various types.

[c3]   The system for determining a prepayment score of claim [c1], where the

prepayment calculation server further comprises an econometric model that

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generates Low Discrepancy Sequence (LDS)-based scenarios of econometric parameters for input to the prepayment calculation server.

[c4] The system for determining a prepayment score of claim [c1], further comprising means adapted to calculate a total prepayment at time T from the formula:

$$P(T) = (1/S)\sum_{s=1}^{S} P_s(T)$$

where S represents the number of scenarios and P represents the prepayment amount for a given scenario.

[c5] The system for determining a prepayment score of claim [c4], further comprising means adapted to calculate the total prepayment, accumulated by time, in scenario s from the formula:

$$P_s(T) = \prod_{t} p_s(t_t)$$

where p(t) is a prepayment value.

[c6] The system for determining a prepayment score of claim [c5], further comprising means adapted to calculate the prepayment value in a given scenario from the formula:

$$p_s(t) = \Re (A, L, E_s(t))$$

where A is the applicant's data, L is the debt instrument parameters, E is the economic parameters and $\Re$ is an analytical prepayment model.

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[c7]   The system for determining a prepayment score of claim [c1], where the applicant
        is either an individual consumer or an individual household.

[c8]   The system for determining a prepayment score of claim [c1], further comprising
        computer-based means for using data associated with the prepayment score of the
        applicant and terms of the debt instrument to determine a calculation selected
        from the group consisting of: a value of the debt instrument, a value of a portfolio
        containing the debt instrument, a risk to holders of the debt instrument, and a
        price of a servicing contract for a portfolio containing said debt instrument.

[c9]   A method for determining a prepayment score representative of prepayment
        propensity of an individual applicant, comprising:

        collecting debt instrument and applicant information at a debt instrument
originator;

        transmitting the debt instrument and applicant information over a network;

        receiving the debt instrument and applicant information at a service bureau;

        the service bureau calculating a prepayment score the individual applicant, where
the prepayment score is calculated from the formula:

$$Score = \sum_{T} TP(T)$$

        where T represents time and P represents prepayment;

        the service bureau returning the prepayment score over the network to the debt

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instrument originator; and

the debt instrument originator using the prepayment score to customize a debt

instrument product for the individual applicant.

[c10]   The method for determining a prepayment score of claim [c9], where calculating

a prepayment score for the applicant comprises parsing the information into debt

instrument information and applicant information.

[c11]   The method for determining a prepayment score of claim [c10], further

comprising providing the applicant information to a prepayment model library

database and the debt instrument information to a prepayment calculation server.

[c12]   The method for determining a prepayment score of claim [c11], further

comprising the prepayment model library determining the prepayment model that

best applies to the debt instrument information and providing that prepayment

model to the prepayment calculation server.

[c13]   The method for determining a prepayment score of claim [c12], further

comprising the prepayment calculation server receiving a prepayment model and

an econometric model, where the prepayment calculation server further calculates

a prepayment score for the applicant.

[c14]   The method for determining a prepayment score of claim [c13], where the total

prepayment at time T is calculated from the formula:

$$P(T) = (1/S)\sum_{s=1}^{S} P_s(T)$$

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where S represents the number of scenarios and P represents the prepayment amount for a given scenario.

[c15] The method for determining a prepayment score of claim [c14], where the total prepayment, accumulated by time, in scenario s is calculated from the formula:

$$P_s(T) = \prod_i p_s(t_i)$$

where p(t) is a prepayment value.

[c16] The method for determining a prepayment score of claim [c15], where the prepayment value in a given scenario is calculated from the formula:

$$p_s(t) = \Re\,(A, L, E_s(t))$$

where A is the applicant's data, L is the debt instrument parameters, E is the economic parameters and $\Re$ is an analytical prepayment model.

[c17] The method for determining a prepayment score of claim [c9], where the applicant is defined as an individual consumer or an individual household.

[c18] The method for determining a prepayment score of claim [c9], further comprising rating a broker based on prepayment scores of applicants that are clients of said broker.

[c19] The method for determining a prepayment score of claim [c9], further comprising using the prepayment score of the applicant and terms of the debt instrument to assist in determining a calculation selected from the group consisting of: a value

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of the debt instrument, a value of a portfolio containing the debt instrument, a risk

to holders of the debt instrument, and a price of a servicing contract for a portfolio

containing said debt instrument.

[c20]   The method for determining a prepayment score of claim [c9], further comprising

packaging said debt instrument into a portfolio based, at least in part, on the

prepayment score of the applicant.

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Abstract of the Disclosure

A method and apparatus is disclosed for determining the prepayment propensity of individual borrowers. Early payment of debt instruments, such as loans and leases, can lead to losses being suffered by lenders. The present invention analyzes the demographics associated with a particular borrower to determine both the individual and group based prepayment propensity. The history of the borrower, the history of the borrower's demographic group, interest rate trends and other factors are then used to calculate a prepayment score that can be used by the lender to determine the propensity of a given borrower to prepay the instrument in question. The score of the individual borrower can be used to estimate the profitability of a debt instrument and allow the lender to make appropriate adjustments prior to issuing the instrument. The individual prepayment scores of a lender's or broker's clients can also be used to rate the lender or broker.

```
┌─────────────────┐
│     Obtain      │
│   Application   │
│      Data       │
└─────────────────┘
         │
         ▼
```

```
┌─────────────────┐
│  Electronically │
│Parse Information│
└─────────────────┘
         │
         ▼
```

```
┌─────────────────┐
│     Create      │
│   Prepayment    │
│      Score      │
└─────────────────┘
         │
         ▼
```

```
┌─────────────────┐
│                 │
│ Return Score to │
│     Lender      │
│                 │
└─────────────────┘
         │
         ▼
```

```
┌─────────────────┐
│                 │
│Create Customize │
│  Loan Product   │
│                 │
└─────────────────┘
```

FIGURE 1

FIGURE 2

FIGURE 3

```
            ┌─ 62
       ╭──────────────────────────╮
       │                          │
       │     Prepayment           │
       │   Historical Data        │
       │                          │
       ╰──────────────────────────╯
                    │
                    ▼
      ┌─ 90
   ┌──────────────────────────────────┐
   │   Prepayment Model Fitting        │
   └──────────────────────────────────┘
         │                    ▲
         ▼                    │
   ┌─ 92            ┌─ 94
 ┌──────────────┐   ┌──────────────┐
 │  Prepayment  │   │   Consumer   │
 │    Model     │   │ Information  │
 │ Pararmeters  │   │              │
 └──────────────┘   └──────────────┘
         │                    ▲
         ▼                    │
        (A)                  (B)
```

FIGURE 4

FIGURE 5

100 — Econometric Historical Data

102 — Current Market Environment

104 — Econometric Model Fitting Module

106 — Econometric Model Scenario Generator

50 — LDS

108 — Scenarios

C D

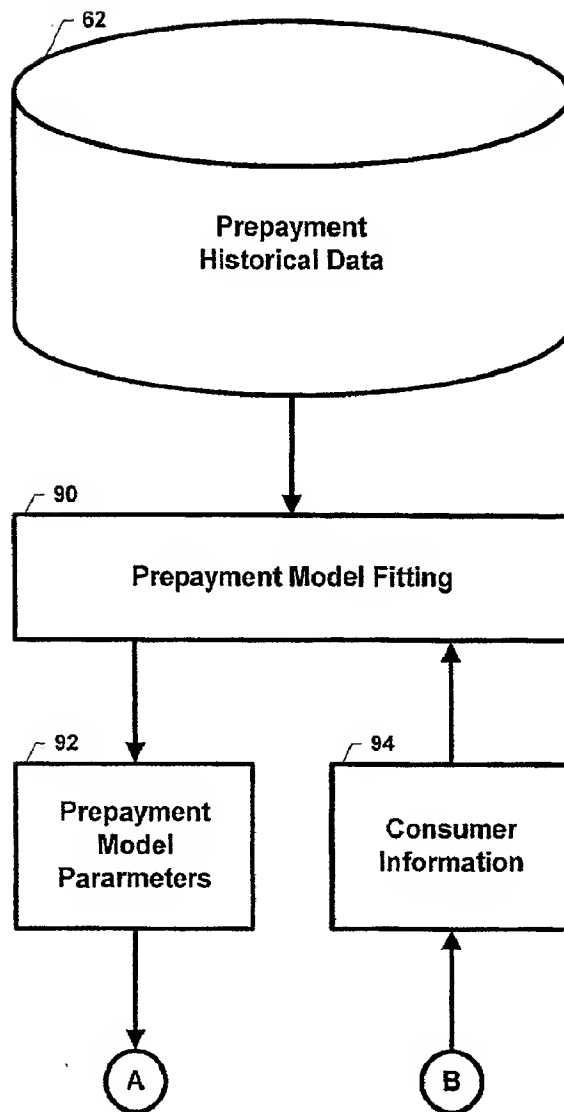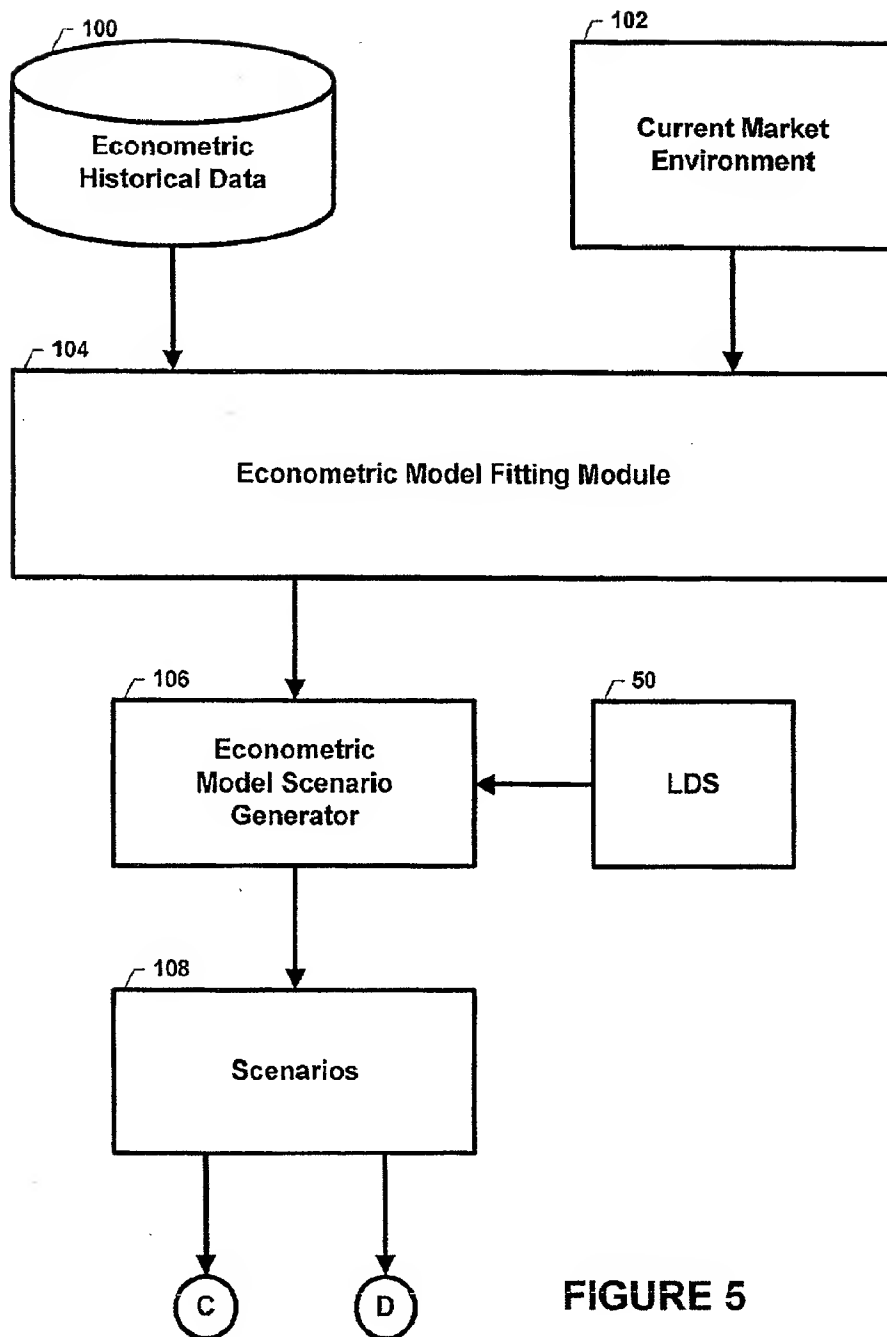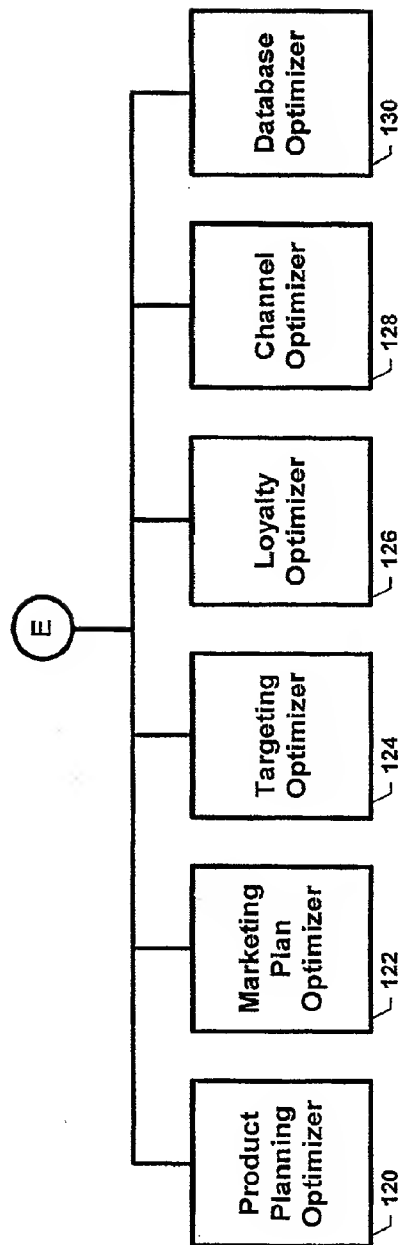| Product Planning Optimizer	Marketing Plan Optimizer	Targeting Optimizer	Loyalty Optimizer	Channel Optimizer	Database Optimizer
120	122	124	126	128	130

E

FIGURE 6

DECLARATION - USA PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, mailing address and citizenship are as stated below next to my name;

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled **METHOD AND APPARATUS FOR DETERMINING A PREPAYMENT SCORE FOR AN INDIVIDUAL APPLICANT**; the specification of which was filed on August 30, 2001 as Application Serial No. 09/942,983.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above;

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56;

I hereby claim the benefit under Title 35, United States Codes § 119(e) of any United States provisional application(s) listed below.

Application No.: 60/228,954   Filing Date: August 31, 2000

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful, false statements may jeopardize the validity of the application or any patent issued thereon.

_____

Full name of first inventor: **Yuri Galperin**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: USA

Mailing Address: same as above

Full name of Second inventor: **Vladimir Fishman**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: USA

Mailing Address: same as above

Full name of Third inventor: **William A. Eginton**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: USA

Mailing Address: same as above

Full name of Fourth inventor: **Charles L. Jones III**

Inventor's signature _____

Date _____

Residence: _____

Citizenship: _____

Mailing Address: same as above

Send Correspondence To:
KNOBBE, MARTENS, OLSON & BEAR, LLP
Customer No. 20,995

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Yuri Galperin, et al.
Appl. No.	:	09/942,983
Filing Date	:	Augusts 30, 2001
For	:	METHOD AND APPARATUS FOR DETERMINING A PREPAYMENT SCORE FOR AN INDIVIDUAL APPLICANT
Examiner	:	Siegfried E. Chencinski
Group Art Unit	:	3692

CONSENT OF ASSIGNEE TO CORRECT INVENTORSHIP UNDER 37 C.F.R. § 1.48(a)(5)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The undersigned is empowered to act on behalf of the Assignee of the above-referenced application. The Assignee represents that it is the 100% owner of the above-referenced application by virtue of assignments, copies of which are attached hereto. The Assignee hereby consents to the addition of the following inventor to the above-captioned application:

Charles L. Jones III

Dated: _____   By: _____

                                       Name: _____

                                       Title: _____

                                       MARKETSWITCH CORPORATION

4093536:kc
080207

-1-

EXHIBIT E

Ted.Cannon

From:	Postmaster (Experian.com) [postmaster@experian.com]
Sent:	Thursday, September 06, 2007 1:19 PM
To:	Meltzer, Laura
Subject:	Delivery confirmation

Attachments: ATT546934.txt; ATT546936.txt

Status of your message sent to the following recipients:

drew@eginton.net: relayed